

Amendments to the Drawings:

The attached sheets of drawings include changes to Figures 1 and 3. These sheets, which includes Figs. 1-6, replace the original sheets including Figs. 1-6.

Attachment: Replacement Sheets

REMARKS

Claims 1-2, 9-10, 15-16, 18-21, and 23-36 will be pending upon entry of the present amendment. Claims 1, 9, 15, 18, 23, and 27 are being amended. Claims 17 and 22 are being canceled. No new matter is being presented.

Independent claims 1 and 9 are being amended to include all of the elements of claims 22 and 17, respectively. Claims 15, 18, 23, and 27 are merely being placed in independent form. Accordingly, none of the claim amendments present any new issues for consideration or necessitate a new search.

One embodiment of the invention is directed to a method of processing video data to detect field characteristics of the data, and in particular, to detect whether a field is progressive or interlaced. The method includes calculating first and second difference values as differences between pixels of a current field and pixels of a previous field and differences between the pixels of the current field and pixels of a subsequent field, respectively. In contrast to prior art methods, the method determines whether the current field is an interlaced field or a progressive field with respect to the subsequent field based on the first and second difference values.

Claims 1-2, 9-10, 17, 29-30, and 33 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,452,011 to Martin et al. ("Martin").

Martin does not anticipate the invention recited in claim 1, as amended. Claim 1 recites a method that includes calculating first and second difference values as differences between pixels of a first field and pixels of a previous field (second field) and differences between the pixels of the current field and pixels of a subsequent field (third field), respectively. In addition, the method calculates a ratio between the first and second difference values, compares the ratio with a threshold, and determines whether the first field is an interlaced field or a progressive field based on the calculating and comparing steps. Martin does not disclose any of those features of claim 1.

Martin does not calculate a first difference value of differences between a first field and a previous, second field and a second difference value of differences between the first field and a subsequent, third field, as recited in claim 1. Instead, Martin calculates difference

values between a current field j and two previous fields $j+1$, $j+2$. Martin does not suggest calculating the difference value between current field j and a subsequent field $j-1$.

Martin does not disclose determining whether a first field is progressive or interlaced based on first and second difference values. As discussed in column 3, lines 8-52 and shown in Figure 2, Martin determines whether successive fields j and $j+1$ are interlaced based on the difference values between those two successive fields only. The Examiner points to column 2 of Martin as also showing the calculating of the difference value between fields j and $j+2$, but the difference value between fields j and $j+2$ is not used to determine whether a field is progressive or interlaced. Instead, the difference value between fields j and $j+2$ is used only after determining whether fields j and $j+1$ are interlaced, in order to determine whether fields are repeated (Fig. 3 and column 4).

The applicants respectfully disagree with the Examiner's unsupported assertion that the same steps discussed in column 3 for the example of j and $j+1$ are taken for the input of reference numbers 17 and 20 for the difference of j and $j+2$ (page 2, last 4 lines). Martin makes clear that only two successive fields j and $j+1$ are used to determine whether those fields are interlaced (col. 3, lines 15-52). If the Examiner continues to assert that Martin uses the difference values between fields j and $j+2$, the applicants respectfully request that the Examiner explain where Martin provides such a disclosure.

Finally, Martin does not disclose the new steps of claim 1, taken from claim 22, of calculating a ratio between the first and second difference values, comparing the ratio with a threshold, and determining whether the first field is an interlaced field or a progressive field based on the calculating and comparing steps. As discussed above, Martin does not disclose calculating the second difference values, and thus, Martin cannot disclose calculating a ratio of the first and second difference values. Moreover, although Martin calculates difference values between fields j and $j+1$ and between fields j and $j+2$, Martin does not suggest calculating a ratio of those difference values. Instead, as discussed above, Martin uses only the difference value between j and $j+1$ to determine if successive fields are interlaced (col. 3; Figure 2), and uses the difference values between j and $j+2$ to determine whether to excise repeated fields of information (col. 4; Figure 3).

Although the Examiner did not point to anything specific in the prior art in support of the rejection of claim 22, the Examiner discussed similar features of claims 17 and 33. In particular, the Examiner indicated that Martin teaches calculating the ratio of difference values and comparing it to a threshold in col. 3, lines 8-68. The applicants disagree because the only ratio calculated in column 3 is ratio R, which is calculated only with respect to fields j and j+1. Specifically, the ratio R is equal to $FR(k)/Fd(k)$ (line 35). Martin states that $FR(k)$ "corresponds to line-to-line pixel differences within a frame comprised of fields j and j+1" (lines 27-29). Further, Martin states that $Fd(k)$ is equal to $Fd_j(k) + Fd_{j+1}(k)$, which respectively "correspond to line-to-line pixel difference values within respective fields j and j+1" (lines 31-34). Accordingly, the ratio R is computed based only on two fields (j and j+1), and thus, cannot be the ratio of claim 1, which is based on difference values between first, second, and third fields.

Accordingly, amended claim 1 is not anticipated by Martin.

Claims 2 and 29-30 depend on claim 1, and thus, are also not anticipated by Martin.

Although the language of claims 9-10 is not identical to that of claims 1-2, the allowability of claims 9-10.

The rejection of claim 33 based solely on Martin is not understood. Claim 33 depends on claim 31 which was not rejected based on Martin. In fact, the Examiner admitted that Martin does not disclose all of the features of claim 31 (see page 4 of office action), and thus, Martin cannot anticipate claim 33. Accordingly, claim 33 will be treated in more detail below with respect to the obviousness rejection of claims 31-32 and 34-36.

Claims 15-16, 18-28, 31-32, and 34-36 were rejected under 35 U.S.C. § 103 as being unpatentable over Martin in view of U.S. Patent No. 4,661,853 to Roeder.

Martin and Roeder do not teach or suggest the invention recited in claim 23. Claim 23 recites that calculating the first difference value comprises calculating pixel differences between the pixel of the first field and two pixels of the second field; selecting a smaller pixel difference between the pixel differences; and accumulating the smaller pixel difference. The Examiner admitted that Martin does not teach those features, but asserted that Roeder does.

The applicants disagree with the Examiner's assertion that Roeder teaches the features of claim 23. Roeder does not teach calculating pixel differences between the pixel of the first field and two pixels of the second field. Figures 1A-1D each show an array of circles with numbers each representing a single pixel difference between one current pixel of one frame or field and one pixel of another frame or field (col. 2, lines 46-68). Nothing in Figures 1A-1D or the accompanying discussion suggests that one pixel of one field or frame is compared to two different pixels of another field or frame.

The Examiner also mistakenly refers to the discussion of Figure 4 in columns 4-5 of Roeder as teaching the steps of claim 23. Figure 4 shows a subtracter 70 that compares an incoming video signal with a delayed video signal that is delayed by one frame interval. Nothing in the discussion of the subtracter 70 or any other portion of Figure 4 states or implies that the same pixel of one of the video signals is compared to two different pixels of the other video signal.

Even if Roeder had suggested calculating pixel differences between one pixel of the first field and two pixels of the second field, Roeder still would not suggest the invention because Roeder does not suggest selecting the smaller of such pixel differences. Figure 4 of Roeder shows the subtracter 70, an absolute value circuit 72, a comparator 74, a threshold value 76, horizontal line delay elements 84, and several sample-period delay elements 85-104, none of which are configured to select the smaller of two difference values. The only comparing done in Figure 4 is the comparing of each difference value with the threshold value 76 by the comparator 74, but the comparator 74 never compares two difference values to select the smaller one.

For the foregoing reasons, claims 23-24 are nonobvious in view of Martin and Roeder.

Martin and Roeder do not teach or suggest any of the features of claim 25. Claim 25 recites calculating the number of moving pixels between said second and third fields, wherein the determining step includes determining that said first field is an interlaced field if said number is lower than a moving pixel threshold, and determining that said first and third fields are progressive if said number is not lower than the moving pixel threshold. As with claim 23, the

Examiner admits that Martin does not teach the recited elements of claim 25, but mistakenly asserts that Roeder supplies the missing teaching.

Martin and Roeder do not teach or suggest the claimed invention because Roeder does not supply the teachings of the elements of claim 25 that are missing from Martin. Figures 5-8 of Roeder show various embodiments of logic circuits that can be used to detect motion, but none of the embodiments count moving pixels and compare the moving pixel count to a threshold. Figures 5-6 involve logically ANDing various combinations of binary pixel differences (see col. 2, lines 62-68 for conversion of pixel differences to binary values) and logically ORing the outputs of the AND gates (110-116 or 120-126). Figures 7 and 8 are logic circuits that provide various combinations of pixel difference sign values and magnitude values. None of the logic gates of Figures 5-8 would provide a count value of the number of moving pixels or compare a count value to a threshold. For example, the AND gate 110 determines whether all of the magnitude inputs 13, 14, 18, 19 are logical ones, but those magnitude inputs are not indications of moving pixels, so the output of the AND gate 110 is not anything representing a count of moving pixels.

For the foregoing reasons, claims 25-26 are not rendered obvious by the cited prior art.

Martin and Roeder does not teach or suggest the invention recited in claims 27-28. Claims 27-28 discuss various steps involving verifying and responding to scene changes. Roeder does not even mention any scene changes or any steps for responding to scene changes. Martin detects isolated fields that are out of sequence due to editing, but responds to such isolated fields simply by excising the isolated fields.

Martin and Roeder do not teach or suggest any of the other features of claim 27 regarding verifying and responding to scene changes. First, claim 27 states that, if the step of verifying reveals that a scene-change has occurred, then the method includes performing a moving pixel detection to determine whether first and second fields are interlaced. As discussed above, Martin responds to the detection of isolated fields only by excising the isolated field rather than determining whether the fields are interlaced. In fact, Martin determines in step 109

of Figure 4 whether fields 0 and 1 are interlaced in response to determining in step 107 that the field 0 is **not** an isolated field.

Even if Martin and Roeder had suggested determining whether fields are interlaced in response to detecting a scene change, Martin and Roeder still would not teach the claimed invention because Martin and Roeder do not teach or suggest determining whether fields are interlaced in the manner recited in claim 27. In particular, claim 27 recites calculating first and second differences between a pixel of a third pixel and two different pixels of a first field, calculating a third difference between a different pixel of the third field and one of the same pixels of the first field, and determining that the third and fourth pixels as interlaced if the first, second, and third differences are greater than an interlace threshold. As discussed above with respect to claims 23-24, Martin and Roeder do not teach or suggest calculating two pixel difference between a single pixel of one field and two different pixels of another field. As such, Martin and Roeder cannot suggest determining that the third and fourth pixels as interlaced based on such pixel differences

For the foregoing reasons, claims 27-28 are nonobvious.

For the remaining claims, their obviousness will be apparent in view of the above discussion. In particular, although the language of claims 15-16 and 34 is not identical to that of claim 23, the allowability of claims 15-16 and 34 will be apparent in view of the discussion of claim 23. Although the language of claims 18-20 and 31-36 is not identical to that of claim 25, the allowability of claims 18-20 and 31-36 will be apparent in view of the above discussion of claim 25. Although the language of claims 32-33 is not identical to that of claim 1, the allowability of claims 32-33 will be apparent in view of the above discussion of claim 1. Although the language of claims 35-36 is not identical to that of claim 27, the allowability of claims 35-36 will be apparent in view of the above discussion of claim 27.

Drawings – Formal drawings of Figures 1-6 are being presented herewith. In addition, Figures 1 and 3 have been amended to include identifiers in the blocks of the block diagrams shown therein. No new matter is being presented.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Application No. 09/914,171
Reply to Office Action dated April 19, 2005

All of the claims remaining in the application are now clearly allowable.
Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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RXI:lmf

Enclosures:

Postcard

6 Sheet(s) of Drawings (Figures. 1-6)

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